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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
841 Chestnut Building  
Philadelphia, Pennsylvania 19107

MAR 29 1993

Mr. Paul V. Panek, Project Officer  
Hazardous Sites Cleanup Program  
Northeast Regional Office  
Cross Valley Center  
667 North River Street  
Plains, Pennsylvania 18705-1099

Dear Mr. Panek:

EPA has reviewed your comments on the proposed plan in your letter of January 7, 1993 concerning the draft proposed plan for the Aladdin Plating site in Lackawanna County. In addition, PADER stated in a subsequent telephone conversation that the electro-kinetic method would be a possible alternative for the Aladdin Site. We have investigated the electro-kinetic method and have found that the Aladdin Site is a poor candidate for this method. Therefore, we have concluded that Alternative #2, which includes installation of two additional monitoring wells, deed restrictions, and long term monitoring, is the preferred alternative for this site.

EPA's remedial objective in the proposed plan is to prevent human exposure to chromium. At this site, the chromium has been effectively contained by the low permeability of the surrounding soil and is not migrating. The chromium is primarily limited to the shallow zone, with only low levels detected in the intermediate zone. No site-related chromium has been identified in the bedrock aquifer (which is the drinking water supply for the area) either on or off the site.

PADER has the additional concern that the contaminated water may violate the State's requirement of attaining background levels for all contaminants. EPA is intending to waive this requirement because ground water treatment at the Aladdin site is technically impracticable. The ground water in question is not considered an aquifer by EPA standards. The wells do not yield sufficient ground water for extraction on a consistent basis, as evidenced by the numerous attempts to monitor ground water performed by EPA. Our experience has been that most of the wells are unable to provide three well volumes of water. This renders a pump and treat method technically impracticable. In addition, the alternatives in the feasibility study are also unable to treat the ground water for the reasons that are discussed below.

For chromium contamination, the electro-kinetic extraction method primarily works with trivalent chromium. Hexavalent chromium moves toward the anion, which is opposite the direction

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of induced water flow. The hexavalent chromium can be collected at the anode end, but only at about a 30% recovery rate. At Aladdin, pretreatment would be required to convert the hexavalent chromium to trivalent chromium for the chromium to move towards the cathode. However, it would be difficult to successfully complete this conversion, and costs would increase significantly. EPA's Office of Research and Development (ORD) has reviewed information on the Aladdin Site, and has concluded that it would not be efficient for this site. A copy of their memo is enclosed.

Another alternative proposed is the barrier method, which would treat the shallow ground water as it flowed through the barrier, converting it to trivalent chromium. However, due to the very slow movement of ground water in this zone, this method would take an extremely long time to be effective. All of the contaminated ground water would have to move laterally through the barrier for effective treatment to occur. It is possible that this might never occur. Additionally, this alternative would not prevent contamination from migrating vertically downward.

The stabilization method would require excavation of each of the "hot spots" at the site. This would involve heavy equipment activity and disruption of the site. The local residents have already experienced this type of disruption with the soil removal. An additional disruption is unwarranted by the stable conditions of the site. Opening up these areas might temporarily increase infiltration into the shallow zone, possibly increasing the migration rate of contaminants. In addition, this method has not been field proven, and its long-term effectiveness is uncertain.

Presented below are responses to each of the comments. As we discussed in our conference call, the proposed plan is meant to be a brief summary of the site and the preferred alternative. Many of the details that were requested in your comments will be addressed in the Record of Decision (ROD), but not in the proposed plan.

1. The proposed plan is being revised. Information responsive to this comment will be included.
2. NPL listing information will be included in the ROD, but not in the proposed plan.
3. This will be added.
4. Accepted.
5. As noted above, at this site, the contaminants are contained within the site boundaries, and are not moving along a pathway that would affect human health. Ground water treatment at this site is considered to be technically impracticable. In addition,

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EPA is required to perform 5 year reviews of the site conditions. EPA, through these reviews, can determine if additional action is warranted at a later date.

6. A brief discussion will be added. More details will be provided in the ROD.

7. See 5 above.

8. The discussion of risk has been revised to briefly state our conclusions about the risks presented by the site. Details on the risk assessment will be presented in the ROD.

9. No carcinogens were of concern at this site. This will be discussed in the plan.

10. No. The risk assessment included an evaluation of potential risks to children swimming in or consuming fish from Bell Mountain Creek, and hazard indexes were all 0.01 or less.

11. "No Action" alternatives can include monitoring, although it would be more accurate to include monitoring in the title.

12. EPA's ORD reviewed information from the RI to determine the potential for success of these methods at this site. As noted in their memo, ORD has stated that the chromium contamination at this site does not lend itself to the electro-kinetic process without extensive pre-treatment, creating more uncertainty about its use. *Basically, ORD feels the method will not work at this site.* There is already a SITES project evaluating this method.

13. All the alternatives were considered for the site. However, we did not consider entering these in the SITES program.

14. Details on the design would not be available until the Remedial Design stage, but more information will be provided in the ROD.

15. This statement is correct.

16. This will be included in the ROD.

17. This method calls for mixing iron-bearing materials into the soil. The hexavalent chromium is converted to trivalent chromium, which then binds with the soil, where it would be less mobile. The soil would not be removed. This is an in situ treatment that reduces the toxicity and mobility of the chromium.

18. Due to the low permeability of the soils, the contamination is not expected to migrate significant distances from its current location.

19. The proposed plan will recommend Alternative #2. There are deed restrictions in this Alternative. In addition, the

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monitoring program that is part of this alternative would identify any changes in contaminant migration. If adverse changes were identified, appropriate action would be taken at that time.

20. Ground water monitoring data collected to date does not indicate that fracturing of clay-rich glacial till has occurred.

20. (#2) Appropriate figures will be provided.

21. Analytical results collected to date from residential wells in the bedrock aquifer do not suggest that pumping has affected migration of chromium.

22. Page 3-66 of the RI indicates that chromium detected in monitoring wells that tap intermediate water-bearing zones is site-related. However, the mechanism for chromium transport between the intermediate water-bearing zones and the shallow water-bearing zone or the bedrock aquifer is uncertain given that the intermediate zone consists of saturated, discontinuous lenses in the overburden horizon. Recall that many intermediate-zone wells are frequently dry or have limited saturated thicknesses, and behave somewhat as perched zones. Unfortunately, the aquifer tests that were performed in 1987 provide little information regarding a hydraulic connection between the intermediate water-bearing zones and the bedrock aquifer. The recording tape malfunctioned in the one intermediate well (MW-6-AW) that was monitored during the test. This well only contained about one foot of water at the beginning of the test, thus it was only known that drawdown in this well exceeded one foot over the 12-hour test that dewatered the pumping well (MW-1-RW).

Wells in the intermediate zone will be included in the long term monitoring program to evaluate future impacts on this zone.

23. While hexavalent chromium is very soluble, it is not mobile at this site due to the low hydraulic conductivity of the soil. Only one intermediate well had dissolved hexavalent chromium in it, although six did have total dissolved chromium at various levels. Some of these are believed to be due to incomplete filtration of samples. What the modeling showed was that the levels predicted in the bedrock aquifer, when it eventually reaches that far, will be below MCLs. This will be through reduced concentrations due to dissipation of the plume, and through any attenuation that does occur.

24. One scenario for the modeling assumed an unsaturated zone of 150 feet over the length of which chromium transport took approximately 2000 years; therefore, the discussion of static conditions does not apply. As discussed in answer #5 above, the contaminants have not left the site boundaries. EPA will continue to review the ground water for off-site migration.

25. Alternatives 3 through 6 attempt to reduce the contamination

levels, which would prevent future exposure for any possible scenarios at the site. Only Alternative 5, which relies on the movement of the ground water through the barrier, would leave contamination on the site more than a year. Deed restrictions in Alternative 2 will prevent actions that would create conditions for exposure to the contaminated ground water.

26. Our studies have shown that there is no adverse impact on Bell Mountain Creek.

27. A detailed discussion of ARARs will be presented in the ROD. The proposed plan will provide a general discussion on ARARs.

28. We are gathering additional information on the methods discussed in the FS. A detailed rationale for any waivers will be presented in the ROD.

29. Standard pump and treat methods would not be effective at this site due to the extremely low yield of the shallow overburden.

30. This discussion has been deleted from the proposed plan. The ROD, however, will assume that treatment will meet discharge limits.

31. The ARARs will be presented in detail in the ROD.

32. We are aware of DER's position on remediation to unrestricted use levels. This position was considered in our decision as presented in the proposed plan. It should be noted that the low yields prohibit use of the ground water.

33. Alternative #2 includes deed restrictions.

34. The costs presented in the Feasibility Study for these methods are estimates, and actual costs could vary significantly. We considered whether or not a treatability study could be performed on this method. However, ORD's comments indicate that there are additional uncertainties with this method at Aladdin. The conclusion is that electro-kinetics is not currently a feasible option at this site.

We appreciate your input on this matter. Before issuing the proposed plan to the public, we will provide you with a copy of it. If you have any comments or questions in the interim, please call me at (215) 597-4750.

Sincerely,



Gregory Ham  
Remedial Project Manager

Enclosure

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF RESEARCH AND DEVELOPMENT  
RISK REDUCTION ENGINEERING LABORATORY  
CINCINNATI, OHIO 45268

RECEIVED

FEB 22 1993

PA. Remedial Response Section

DATE: February 11, 1993

SUBJECT: Review of Feasibility of Electrokinetic Extraction  
at the Aladdin Plating NPL Site in Pennsylvania

FROM: Randy A. Parker *RAP*  
Environmental Engineer, Risk Reduction Engineering  
Laboratory

TO: Gregory Ham, RPM  
Eastern Pennsylvania Remedial Section

I have reviewed the Remedial Investigations Summary for the Aladdin Plating Superfund site with respect to the feasibility of using electrokinetics for remediation of hexavalent chromium in the shallow water-bearing zone. With electrokinetics, contaminants present in the groundwater and/or desorbed from the soil will be transported towards the electrodes depending on their charge. The valence of the chromium at this site is such that the movement of chromium would be from cathode to anode. Electro-osmotic flow, water transport due to electrical gradients, is in the direction from anode to cathode. Therefore, with electrokinetic extraction, the flow of chromium at this site is opposite the induced hydraulic flow. For maximum efficiency of the electrokinetic process, the induced hydraulic and electric flows should have the same direction.

Possible options for more effective electrokinetic removal of the chromium are to use lead electrodes in the electrokinetic process and remove the chromium as a lead chromate precipitate, or to add iron(II) to the groundwater to reduce the chromium from a 6 state to a 3 state. Chromium (III) would flow from anode to cathode, the same direction as the electro-osmotic flow.

Information on the cost of a treatability study of electrokinetics at this site are unavailable at this time because this technology is still in the bench and pilot scale stages with work performed mostly on soils. No data has been published for field-scale efforts or treatability studies.

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